DESIGN OF AN OVERPASS STRUCTURE FROM SKYLINE DRIVE IN QUIRINO HIGHWAY, BRGY. TUNGKONG MANGGA, SAN JOSE DEL MONTE, BULACAN

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In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Civil Engineering
Major in Construction Engineering and Management

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RECOMMENDATION

This is to certify that this research entitled "DESIGN OF AN OVERPASS STRUCTURE FROM SKYLINE DRIVE IN QUIRINO HIGHWAY, BRGY. TUNGKONG MANGGA, SAN JOSE DEL MONTE, BULACAN" Prepared and Submitted by Ace B. Cabbab, Jeraldine C. Cullo, Jaylord O. Luneza, and Jan Marie A. Reyes been examined the PRE-ORAL DEFENSE

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CERTIFICATE OF ORIGINALITY

We hereby certify that this research is our own work and that does not contain any material previously written or published by another person or organization. It also does not contain any material accepted for a degree or diploma from a university or institution of higher learning unless acknowledged.

Furthermore, we declare that the intellectual content of this research is a manifestation of our extensive efforts to understand the concepts, even though we have received assistance from others, as can be observed in the manner of our representation.

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ABSTRACT

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CHAPTER 1

The problem and its Background

This chapter provides an overview of the chosen topic and sets the context for the study based on the research objectives. It outlines the framework that guides the investigation, including the main goal of underlying assumptions.

Introduction

Traffic congestion is a growing problem in many urban areas, including San Jose del Monte, Bulacan, where rapid population growth and increasing vehicle numbers have placed significant pressure on existing roads. The area in Skyline Drive and Quirino Highway in Barangay Tungkong Mangga is one of the most affected. Due to the presence of a hospital and a church in this location, the area attracts many visitors, particularly during peak hours. This causes heavy traffic that not only leads to delays but also creates safety concerns for both drivers and pedestrians.

This creates long delays and can be dangerous for both drivers and pedestrians. This study aims to design an overpass that will help reduce traffic jams and improve safety at this busy location. The overpass will enable vehicles and pedestrians to cross more easily without interfering with one another. The research will check if the overpass design is strong enough to handle the expected traffic and weather conditions.

The research will also include a cost estimate to see if the project is affordable. By studying the overpass's effects on traffic flow, safety, and structural strength, the research will give practical advice for better roads in San Jose del Monte. The research will help manage traffic and make the area safer and more efficient in San Jose del Monte.

Background of the Study

San Jose del Monte, Bulacan, has been experiencing rapid urban growth, increasing the number of vehicles and pedestrians in busy areas. One of the most traveled places is the junction from Skyline Drive in Quirino Highways, Barangay Tungkong Mangga. This area is important because it connects many commuters, including public transport users, students, workers, seniors, and persons with disabilities. However, the traffic volume, especially during peak hours, causes congestion and increases safety risks for both drivers and pedestrians.

There are many vehicles using this road, including jeepneys, buses, private cars, and motorcycles. Pedestrian crossing near this junction also contribute to slowing down vehicles, making traffic flow uneven and sometimes dangerous. This creates a need for a practical solution to improve road connectivity, reduce congestion, and enhance pedestrian safety.

One way to address these challenges is by building an overpass that allows vehicles and pedestrians to move smoothly without interfering with each other. An overpass can improve accessibility, reduce travel time, and lessen accident risks by separating traffic flows. In this context, the stucy aims to design and analyze the structural safety of an overpass near Skyline Drive corner Quirino Highway. Ensuring it meets the demands of current and future traffic conditions. The project will also consider cost estimation to evaluate its feasibility for local government implementation.

Theoretical Framework

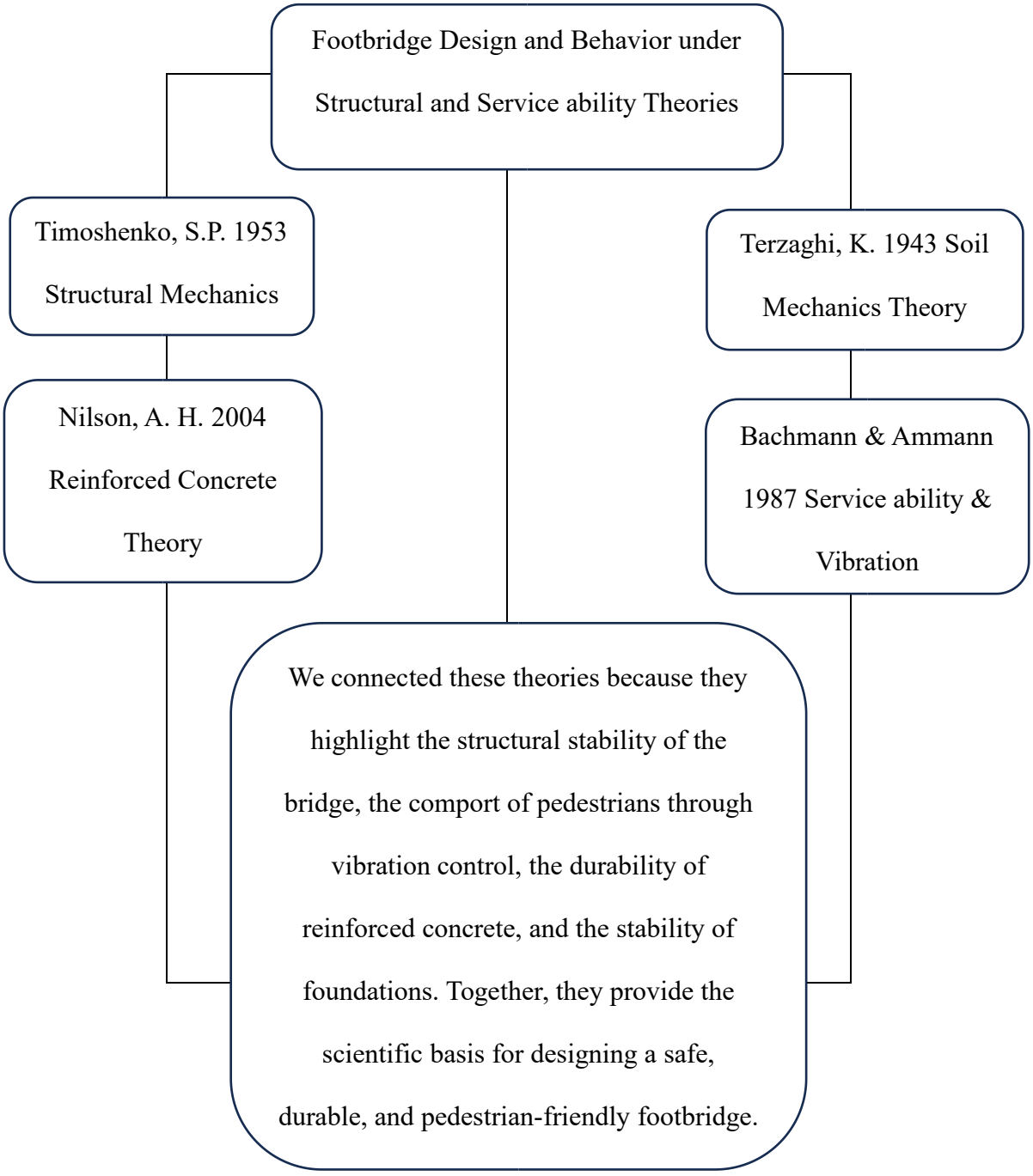
Footbridge Design and Behavior under Structural and Service ability Theories
Timoshenko, S.P. 1953 Structural Mechanics
Terzaghi, K. 1943 Soil Mechanics Theory
Nilson, A. H. 2004 Reinforced Concrete Theory
Bachmann & Ammann 1987 Service ability & Vibration
We connected these theories because they highlight the structural stability of the bridge, the comport of pedestrians through vibration control, the durability of reinforced concrete, and the stability of foundations. Together, they provide the scientific basis for designing a safe, durable, and pedestrian-friendly footbridge.

Figure 1. *Theoretical Framework*

Conceptual Framework

INPUT	PROCESS	OUTPUT
1. How does the demographics profile of the respondents be gauged in terms of: 1.1. Senior 1.2. Age 1.3. Participants 1.3.1 Students 1.3.2 Workers 1.3.3 Seniors, PWD, Pregnant women 2. How can the overpass design from Skyline Drive in Quirino Highway, SJDM Bulacan be assessed in terms of: 2.1 Pedestrians 2.2 Drivers 3. How effectively will the new overpass design improve the improvement of vehicles at the key intersection in terms of: 3.1 Accessibility 3.2 Safety 4. How can be the overpass design benefit the beneficiaries in terms of: 4.1. Workability 4.2. Compressive Strength 4.3 Cost Efficiency	1.Conduct site surveys and traffic flow analysis near Skyline Drive and Quirino Highway to identify existing issues and optional locations for the overpass. 2.Gather demographic data and conduct surveys among primary beneficiaries to understand their needs and concerns (seniors, PWDs, pregnant women, students, workers, drivers). 3.Develop preliminary design concepts based on traffic patterns, pedestrian flow, and safety requirements. 4.Perform structural analysis to ensure the overpass can support expected loads and environmental conditions. 5. Gather feedback from stakeholders and the community on the proposed design to refine features and address concerns. 6. Finalize detailed design plans, including safety features, accessibility provisions, and layout	1. Complete design drawings and structural analysis reports for the proposed overpass. 2. Traffic simulation results demonstrating improvements in vehicle flow, safety, and pedestrian movement. 3. Stakeholder feedback report highlighting community needs and acceptance of the design. 4. Cost estimate and phased construction schedule for project implementation. 5. Recommendations for operational safety, accessibility features, and future maintenance plans.

Figure1.2. *Conceptual Framework*

Statement of the Problem

This research aims to design an Overpass Structure from Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose del Monte, Bulacan seek to answer the following questions:

1. What is the demographics profile of the respondents in terms of:
    1.1. Senior
    1.2. Age
    1.3. Participants
        1.3.1 Students
        1.3.2 Workers
        1.3.3 Seniors, PWD, Pregnant women

2. How can the overpass design from Skyline Drive in Quirino Highway, SJDM, Bulacan in terms of:
    2.1. Pedestrians
    2.2. Drivers

3. How effectively will the new overpass design improve the flow of vehicles at the key intersection in terms of:
    3.1. Accessibility
    3.2. Safety
4. How can the overpass design benefit the beneficiaries in terms of:

4.1. Safety

4.2. Travel Time

4.3. Convenience

Objectives of the Study

The main objectives of this study are to design and analyze the structural performance of an overpass from Skyline Drive in Quirino Highway, Barangay. Tungkong Mangga, San Jose del Monte, Bulacan. Specifically, the study aims to:

1. Develop a safe and functional overpass design that addresses current traffic issues in the area, focusing on:

•Vehicle flow improvement

•Pedestrian safety and accessibility

2. Conduct a structural analysis in assess the strength and durability of the proposed overpass, including:

•Load-bearing capacity evaluation

•Resistance to environmental factors

3. Investigate the potential benefits of the overpass for commuters, residents, and businesses by analyzing:

•Reduction in traffic congestion

•Enhanced road safety

•Improved connectivity to nearby facilities such as the hospital and church

4. Provide recommendations for infrastructure development that can support long term traffic management and urban growth planning.

HYPOTHESIS

Ha. There is a significant improvement in traffic flow efficiency and structural safety when an overpass structure is designed using optimized load distribution and modern construction materials compared to conventional designs, leading to enhanced urban connectivity and reduced vehicular congestion.

Ho. There is no significant improvement in traffic flow efficiency and structural safety when an overpass structure is designed using optimized load distribution and modern construction materials compared to conventional designs, leading to enhanced urban connectivity and reduced vehicular congestion.

Significance of the Study

This study is essential because it aims to address safety and mobility issues from Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose del Monte, Bulacan. The insights gained from this research will help the transportation

system and provide safer routes for both drivers and pedestrians the significance of this study includes benefits for the following groups:

1. **Government Officials and Urban Planners** - The research offers important information to support planning and decision-making in developing more effective infrastructure and safety measures

2. **Civil Engineers and Project Developers** - The results will help professionals create reliable and durable overpass designs tailored to local conditions, improving project safety and success.

3. **Motorist and Daily Travelers** - By focusing on safety and smooth movement, the study aims to make commuting safer and more efficient for vehicle drivers and public transportation users,

4. **Pedestrians and Vulnerable Road Users** - The design seeks to enhance pedestrian safety, benefiting groups like elderly people, persons with disabilities, student and employees.

5. **Businesses and the Local Economy** - Improved access and safer roads will support local businesses and encourage economic growth in the community.

6. **Researchers and Students**- This study will serve as a useful reference for future investigations and learning on transportation infrastructure and urban development.

Scope and Limitation

This study focuses on creating a design and performing a structural analysis of an overpass from Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose del Monte, Bulacan. The research includes selecting appropriate materials, determining the size and shape of the overpass, calculating its strength and stability,

and estimating the construction coset (excluding labor and land cost). The goal is to improve traffic movement and safety for both vehicles and pedestrians in this busy area, supporting better access to nearby facilities.

This study is limited to the design and structural analysis of the overpass only. It does not include the effects on nearby infrastructure such as electrical lines, water pipes, or drainage systems. The study does not address traffic control or detour plans during the construction period. Social and environmental impacts, such as noise pollution or displacement of residents, are not considered. This study focuses mainly on the technical design, structural safety, and cost viability of the overpass project. Long-term maintenance and potential future expansions are beyond its scope.

DEFINITION OF TERMS

This research defines the meaning of unfamiliar words and clarifices key concepts, variables, and terminology used throughout the study, ensuring readers understand the specific meaning of terms used, especially technical jargon or acronyms.

Busy Junction- A location where multiple roads meet and there is a high level of traffic often leading to congestion and requiring careful navigation by vehicles and pedestrian

Construant – is a Latin word from related to the verb “to build” or “to construct”, it is not a common english word.

Detour Plan- To go or make someone go a different or less direct route to a place, in order to avoid a problem or to visit somewhere or do something the way.

Footbridge - A grade-separated pedestrian structure that allows safe crossing over as road railways, or waterways. It is designed exclusively for people traveling on foot and, in some cases, bicycles or light mobility aids.

CHAPTER 2

Review of Related Literature

Designing an overpass structure from Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose del Monte, Bulacan, requires a thorough review of existing research on overpass and roadway intersection design. This study builds upon existing knowledge of traffic management and structural design aimed at enhancing roadway efficiency and safety. The literature on overpass structures highlights key considerations such as load capacity, materials, structural integrity, and site-specific challenges.

Foreign Literature

The design of an overpass structure focuses on improving the flow of traffic by separating roadways, allowing vehicles to move without interruption from crossing traffic. Overpasses improve safety by removing points where vehicles and pedestrians could collide, reducing accidents. This design also helps maintain steady vehicle speeds and supports smoother travel, benefiting both major and minor roads. By eliminating intersection, overpass increase roadway efficiency, making transportation safer and more reliable in busy areas. This approach will guide the overpass design on Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose del Monte, Bulacan.

The design of overpasses plays a critical role in mitigating traffic-related issues in urban environments. Overpasses can enhance traffic flow and safety, particularly by reducing vehicle-pedestrian interactions. Research indicates that pedestrian overpasses can decrease pedestrian accidents by up to 90% by ensuring that pedestrians are separated from vehicular traffic, thereby significantly minimizing the risk of fatalities and injuries (Olorunfemi et al., 2021). This reduction in pedestrian-related accidents facilitates smoother vehicular traffic, as drivers do not need to yield for pedestrians crossing at-grade, consequently enhancing overall road efficiency.

Similarly, a research project by Johnson et al. (2020) in Australia explored the use of lightweight, prefabricated materials for pedestrian overpasses to accelerate construction time while maintaining structural integrity. The incorporation of modular beams and dec enabled the construction of sustainable, cost-effective pedestrian bridges that could be rapidly deployed in busy urban settings, thereby 17 minimizing disruptions to traffic below.

In the United States, the American Association of State Highway and Transportation Officials (AASHTO) publishes detailed design guidelines focusing on pedestrian overpasses that address load resistance, seismic considerations, and accessibility enhancements. These guidelines provide comprehensive safety measures including stairway dimensions, ramp slopes complying with the Americans

with Disabilities Act (ADA), and non-slip surfaces to accommodate all users regardless of mobility.

Additionally, a review by Chen et al. (2020) in Transportation Research Part A discusses modular prefabricated overpasses, noting their rapid deployment (up to 50% faster construction) and reduced environmental impact. This is relevant for minimizing disruptions in residential areas like Brgy. Tungkong Mangga during peak construction periods (Chen et al., 2020). Finally, the International Road Federtion's Guidelines for Urban Grade Seperation Structures (2021) advocates for integrated design with pedestrian facilities, emphasizing aesthetic and functional harmony in suburban settings to promote multimodal transport (IRF, 2021).

In a study by Zhang and Huang (2020), overpass design was linked to pedestrian safety and accessibility. Their research highlighted that an overpass must not only ensure safe crossing but also encourage usage through user-friendly design features such as proper lighting, ramps, and weather protection. Poor accessibility often leads to pedestrians to ignore overpass, defeating their purpose.

Kumar et al. (2021) discussed the integration of overpass structure into urban landscapes. They emphasized aesthetic design, noise reduction, and minimizing land acquisition as crucial factors. The study recommended incorporating green spaces and sound barriers to enhance urban livability while maintaining transportation

efficiency.

Local Literature

Urban traffic congestion remains a critical issue in many highly populated Philippines cities, including the National Capital Region and rapidly urbanizing provinces such as Bulacan. Studies have identified poorly designed intersections and the lack of grade-seperated crossings as primary contributors to bottlenecks, extended travel time, and increased vehicle emissions within these urban corridors (Santos & Dela Cruz, 2020).

Complementing these findings, a 2021 report by the Department of Public Works and Highways (DPWH) detailed the successful implementation of overpass projects along like EDSA and Commonwealth Avenue. These overpasses have helped reduce congestion by providing uninterrupted vehicle passage above signalized intersections and have incorporated pedestrian overpasses to maintain accessibility and safety for non-motorized users.

Furthermore, Mendoza et al. (2022) emphasized the importance of holistic urban planning by integrating pedestrian facilities such as dedicated crosswalks and overpasses in areas served by vehicular overpasses. Their study warned that neglecting pedestrian mobility in infrastructure projects could inadvertently increase

accident risk and reduce overall accessibility. This highlights the need for inclusive design approaches to overpasses that cater to all road users.

Furthermore, a DPWH report on urban infrastructure (2020) highlights the integration of overpasses with flood-resilient designs, using elevated abutments in low-lying regions like Bulacan to counter monsoon flooding (DPWH, 2020).

Villanueva (2022) in Journal of Philippine Engineering discusses sustainable materials like recycled aggregates for overpasses, reducing carbon footprint by 15% while complying with local codes, ideal for eco-conscious designs in Tungkong Mangga (Villanueva, 2022).

Lastly, Reyes and Dela Cruz (2020) evaluated pedestrian overpasses in Quezon City and found that proper design elements-such as elevator access, roof covering, and adequate width-encourage public use and reduce jaywalking incidents. The study recommended regular maintenance and community involvement in the planning phase.

Foreign Studies

Road traffic injuries (RTIs) are a serious public health problem and are an important cause of disability and death worldwide. A significant proportion of traffic injuries and fatalities are among pedestrians. According to a study entitled "Accident

Analysis & Prevention"-Faraz M.Khan et al, Pedestrian road traffic accidents (RTAs) are responsible for a substantial number of injuries and deaths in Karachi. A total of 35% of the pedestrians crossing the street caused traffic to swerve to avoid them. Pedestrians crossing one lane at a time were 2.9 times more likely to cause the traffic to swerve than pedestrians who crossed the whole street at once.

According to Mohammad Saadati et al. (2020), Pedestrian bridges are safe tools for street crossing. Bridges structural characteristics, locating and also pedestrian perception and attitudes may affect their bridge use behaviour. Footbridges are usually located across roads and highways so pedestrians can cross safely without causing vehicle traffic issues. Footbridges are mainly built near intersections, schools, hospitals, and other public facilities to prevent people from running and risking their safety to cross the road.

According to Arsandic and Prakoso (2020), A footbridge is an essential facility for pedestrians because it provides safety and comfort to its users. Road traffic has become increasingly congested because of the growing number of automobiles in the city. Pedestrians are the road users most exposed to traffic accidents, especially during rush hour.

In a similar vein, research from Baku, Azerbaijan, examined the broader urban role of pedestrian overpasses. Akhundov (2020) showed that while overpasses

provide necessary safety improvements, their presence can reinforce car dependency and decrease at-grade pedestrian accessibility. The study suggested the need for designing overpasses that are accessible to all users, including persons with disabilities, and are integrated thoughtfully into the urban fabric to avoid further segregating pedestrian zones from city life.

Smith et al. (2021) - "Seismic Performance Evaluation of Reinforced Concrete Overpass Bridges in California." Journal of Bridge Engineering, ASCE.
This study analyzed seismic data from 15 overpass structures in earthquake-prone California, using finite element modeling to assess damage under simulated earthquakes. Findings highlighted the need for enhanced ductile detailing in columns to prevent collapse, with recommendations for retrofitting existing overpasses. Relevance: Emphasizes seismic design considerations for overpass longevity in highrisk areas.

Chen and Liu (2022) - "Sustainable Material Use in Urban Overpass Construction: A Case Study from Shanghai." Sustainability Journal. Researchers evaluated the use of recycled aggregates in concrete for a new overpass in Shanghai, comparing compressive strength and environmental impact via lifecycle assessment. Results showed a 20% reduction in carbon footprint without compromising structural integrity. Relevance: Supports eco-friendly material choices in overpass design to align with green engineering standards.

Kumar et al. (2023) - "Traffic Load Analysis and Fatigue Life Prediction for Steel Overpass Structures in India." International Journal of Steel Structures. Using strain gauge data from an operational overpass in Mumbai, this study modeled fatigue under varying traffic loads. It predicted service life extensions through optimized girder designs. Relevance: Informs load-bearing calculations and fatigueresistant designs for high-traffic overpasses.

Local Studies

Opon et al. (2024) investigated factors influencing pedestrian overpass utilization in Iligan City using Structural Equation Modeling (SEM). The study revealed that only 38.42% of pedestrians utilized overpasses. The main factors affecting usage width, span, accessibility, and perceived safety. The authors recommended integrating improved lighting, roofing, and ramps to make inclusive and user-friendly. This research emphasize the human-centered design aspect of overpass planning.

In Metro Manila, Morales et al. (2022) developed Footbridge Design Standards along España Boulevard to enhance pedestrian convenience and safety. Their study suggested optimal design parameters such as a minimum walkway width, gentle slope, and proper lighting. They concluded that compliance with local accessibility standards improves pedestrian behavior and reduces jaywalking incidents.

Garcia (2021) examined Structural Design Considerations for Overpass in Seismic Zones of the Philippines, aligning the analysis with the National Structural Code of the Philippines (NSCP). the study recommended the applicationof seismic load combinations, ductile detailing and redunduncy to ensure resilience during strong ground motion. Garcia's findings reinforce the need for localized engineering practices that align with national safety standards.

Meanwhile, Reyes and Dela Cruz (2020) evaluated several Pedestrian Overpass in Quezon City through user perception surveys. They found that lack of maintenance, poor lighting, and absence of roofing discouraged use. The researchers suggested improvements such as covered walkways, elevators for persons with disabilities, and enhanced cleanliness to increase public safety and encourage utilization.

Lastly, Mendoza et al. (2022) explored the Socioeconomic Impact of Overpass Construction in Bulacan and Pampanga. Their study revealed that overpass projects not only reduce congestion but also enhance business accessibilityand local productivity. The presence of new overpasses was found to increase land value and stimulate urban development. These findings demonstrate that infrastructure investments like overpasses have both transportation and economic benefits for local communities.

Synthesis of Related Literature and Studies

The reviewed literature and studies, both foreign and local, emphasize the increasing importance of designing structurally sound, user-friendly, and sustainable overpass structures to address traffic congestion and enhance safety in urban environments. Across global research (Johnson et al., 2020; Chen et al., 2020; Kumar et al., 2021; Cantürk, 2022; Huang & Jiang, 2024), a common theme emerges: the integration of engineering efficiency and human-centered design principles. Modern overpasses are no longer viewed solely as traffic solutions but as multifunctional infrastructures that promote mobility, safety, and urban aesthetics. Foreign studies have stressed key engineering factors such as seismic performance, material optimization, modular prefabrication, and advanced drainage systems, ensuring that overpasses can withstand environmental stresses while remaining cost-effective and sustainable. These findings provide valuable references for adapting similar design and safety standards to Philippine conditions, particularly in areas experiencing high traffic volumes and seismic risks.

Local studies (Reyes & Dela Cruz, 2020; Garcia, 2021; Morales et al., 2022; Mendoza et al., 2022; Opon et al., 2024) concentrated on the practical, social, and contextual aspects of overpass design. They underscored the influence of pedestrian behavior, accessibility, safety, and adherence to the Code of the Philippines (NSCP) and Department of Public Works and Highways (DPWH) design standards. Findings revealed that user perceptions of safety, cleanliness, and

convenience greatly affect the effectiveness of pedestrian and vehicular overpasses. Furthermore, local literature showed that properly designed and well-maintained overpasses could significantly improve traffic flow, reduce road accidents and contribute to local economic growth by enhancing connectivity and increasing land value in surrounding areas.

In summary, both foreign and local studies converge on the idea that an effective overpass design must balance technical precision, environmental adaptability, and human usability. Foreign research provides advanced engineering techniques and sustainable innovations, while local studies contextualize these within the Philippine environment—taking into account climate, population density, and accessibility for vulnerable users. Collectively, these studies support the present research's goal of designing a structurally stable and accessible overpass from Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose del Monte, Bulacan, that enhances traffic efficiency and promotes community safety. Moreover, the synthesis reveals a notable research gap: while previous studies have primarily focused on either structural analysis or pedestrian usability, few have integrated both technical and social dimensions within a single comprehensive framework. This gap justifies the current study's approach, which merges engineering design with safety and accessibility considerations to develop a resilient, inclusive, and communityoriented overpass design.

CHAPTER 3

Research Methodology

This chapter focuses on discussing the research methods and procedures followed by the researcher to systematically conduct the experimental study. It specifically details the research design, selection of respondents, sampling techniques, data collection instruments, their construction and validation, administration and retrieval process, as well as the statistical methods used for accurate data analysis and interpretation.

A. Location

The location of the overpass structure design is at Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose del Monte, Bulacan. Based on the observation of the researcher, this area experiences traffic congestion due to a high volume of people and vehicles. The presence of a church and hospital nearby contributes significantly to the heavy traffic. To address this issue, the researcher proposed designing an overpass with safety features to improve traffic flow and ensure safer passage for commuters and nearby residents.

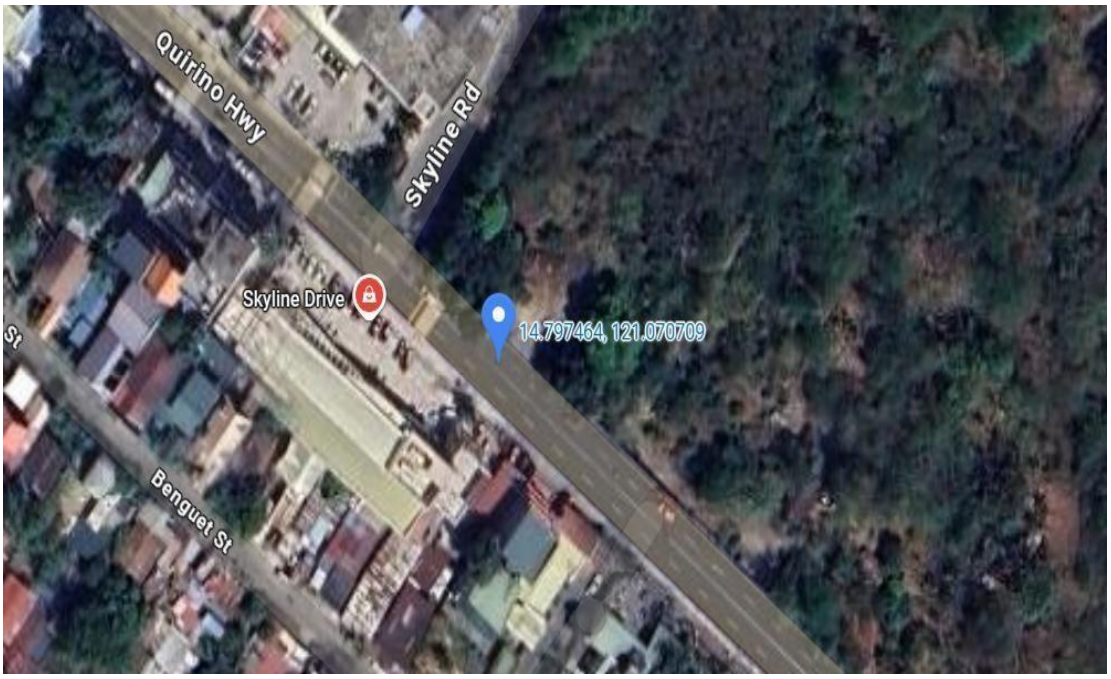

Figure 2: *Site Development Plan*

B. Traffic Survey

A traffic survey was made in October 2025 at the project site. The researcher separates the number of vehicles per classification (Motor,/ Tjeep, Bus, Truck, and Private vehicles) to determine how many vehicles passed by per hour during rush hour. Then observe when is the time where the traffic volume increases.

Research Design

This study utilized a mixed-methods research design that combined descriptive, analytical, and quantitative approaches to develop and evaluate a proposed overpass structure at Skyline Drive and Quirino Highway in San Jose del Monte, Bulacan.

The descriptive method gathered factual data on existing traffic and pedestrian conditions through surveys and observations, while the analytical method applied structural engineering principles and standards such as the NSCP (2015), DPWH Bridge Design Manual (2013), and AASHTO LRFD (2017) to ensure safety, stability, and material efficiency.

Quantitative Analysis conducted to measure improvements in traffic flow, safety, and travel time, supported by data collected from traffic surveys and questionnaires.

This study also incorporates a design-based modeling approach, which consists of two key phases:

2D Structural Design – The first phase involves designing the Overpass Structure using AutoCAD software to create a detailed 2D blueprint, defining its feature and structural components.

3D Visualization – Once the 2D design is completed, it is imported into SketchUp software to develop a realistic 3D model for a clearer visual representation of the overpass.

Research Instrument

In this study a survey questionnaire is utilized as the primary research instrument to collect both qualitative data on the design, impact, and effectiveness of the overpass structure at Skyline Drive in Quirino Highway, Brgy. Tungkong Mangga, San Jose Del Monte, Bulacan. This research focuses on key aspects such as measurements, and structural features of the Overpass structure. The following components are considered:

Materials

The survey questionnaire serves as a structured and data-driven approach to evaluating the efficiency and functionality of the Overpass structure. The research instrument provides valuable insights for traffic management improvements, infrastructure planning, and policy recommendations by gathering input from key intersections.

Data Gathering

The researchers prepared a survey questionnaire that focused on the design aspects of the overpass structure, including structural safety, accessibility, and overall functionality. The questionnaire was designed using a five-point Likert scale ranging

from Strongly Agree to Strongly Disagree to capture respondents' perceptions and suggestions for improvement.

Survey: The questionnaire was distributed to selected respondents to collect primary information based on their opinions and experiences regarding the design and functionality of the overpass structure.

Interview: Informal interviews with local residents were conducted using interview guides to gather qualitative insights that complement the survey data.

Secondary Data: The researchers collected secondary data from online and public sources, including topographic maps, traffic volume records, and soil classification relevant to the overpass site.

Data Integration: Upon completion, the primary and secondary data were combined to aid in developing the initial design concept of the overpass structure, ensuring it meets safety, accessibility, and environmental requirements.

Software Instrument: The researchers utilized AutoCAD and SketchUp to create detailed design models of the overpass structure based on the integrated data. Means of **Data Collection Survey:** Face to face, possibly online, survey On whether there were methods available.

Interview: Face-to-face interview with residents.

Internet Research: Online research and review of public records Data Collection Time Frame The whole process of data collection was about 1-5 days which was sufficient to allow adequate time to distribute surveys, make interviews and to do a comprehensive compilation and analysis of the secondary data.

Statistical Tool

The data gathered from the survey questionnaire were analyzed using the Weighted Mean to determine the respondents' level of agreement on the proposed overpass design in terms of traffic condition, safety, accessibility, and overall effectiveness.

Formula: $WM = \frac{\Sigma(f \times w)}{N}$

Where:

WM = Weighted Mean

W = Weighted of option choices

X = Frequency of each response

N = Number of respondents

Likert's Scale – It is a prearranged system, a one – dimensional scale from which the interviewee would choose one option that reflects their opinion. Five (5) options will be offered.

Rate	Verbal Interpretation	Range
5	Strongly Agree	4.20-5.00
4	Agree	3.40-4.19
3	Neutral	2.60-3.39
2	Disagree	1.80-2.59
1	Strongly Disagree	1.00-1.79

Questionnaire

Title: Design of an Overpass Structure from Skyline Drive in Quirino Highway Brgy. Tungkong Mangga San Jose del Monte, Bulacan.

Introduction:

Good day! We are conducting a research study titled “Design of an Overpass Structure from Skyline Drive in Quirino Highway Brgy. Tungkong Mangga San Jose del Monte, Bulacan”.

This study aims to identify the current condition of the traffic and pedestrian flow, and how these affect daily travel and safety of residents and road users.

Your participation is voluntary, and all answers will be kept confidential and used for research purposes only.

I. Respondent Profile:

1. Age:

○ Below 18 ○ 18 - 25 ○ 26 -50 ○ 51 – 60 above

2. Gender:

○ Male ○ Female ○ Prefer not to say

3. Occupation:

o Student o Worker o Driver o Business owner o Others:

4. Type of Road User:

o Pedestrian o Driver o Commuter o Residents nearby

II.

Instruction: Please check the following statements based on your experience at Skyline Drive and Quirino Highway.

Scale: 5 – Strongly Agree

4 – Agree

3 – Neutral

2 - Disagree

1 – Strongly Disagree

A. Highway Condition

	5	4	3	2	1
Traffic congestion is a serious problem in this area.					
The existing pedestrian crossing are unsafe.					
The number of vehicles has increased over the past years.					

Pedestrians often cross the road in unsafe areas.					
There are frequent accidents or near-miss incidents at this junction.					

B. Design

	5	4	3	2	1
Building an overpass will help reduce traffic congestion.					
An overpass will improve pedestrian safety.					
The proposed overpass location is accessible and convenient.					
The overpass will reduce travel time for commuters and drivers.					
I support the construction of the proposed overpass in our area.					

III.

Instruction: Please answer briefly.

1. What do you think is the main cause of traffic congestion in this area?

2. What other facilities would you like to be included in the overpass (e.g., lighting CCTV, ramps, shade, elevator, handrails, etc.)

November 05, 2025
La Concepcion College
Kaypian Road, corner Quirino St.
San Jose del Monte City

To whom it may concern,

We are 4th Year Bachelor of Science in Civil Engineering students at La Concepcion College, and we are writing to kindly request your approval for the use of our survey questionnaire in line with our research titled “Design of an Overpass Structure from Skyline Drive in Quirino Highway Brgy. Tunkong Mangga San Jose del Monte, Bulacan.” We humbly ask for your review and approval of the attached questionnaire.

Your approval will greatly assist us in proceeding with data collection and ensuring the success of our research project.

Thank you very much for your time and consideration. We look forward to your positive response. Respectfully,

Ace B. Cabbab

Jeraldine C. Cullo

Jaylord O. Luneza

Jan Marie A. Reyes

Engr. Russel R. Llagas
Licensed Civil Engineer

Engr. Eloisa P. Cadag
Research Adviser

Engr. Jore Gil D. Galeza
Head, Engineering Division